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Teens Helping Teens Lose Weight: The Long-Term Effect of an Active Peer Group Behavioral Weight Loss Intervention

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Abstract

Background: Adolescents that are obese have a greater risk of being obese as an adult. Treatment of adolescent obesity is paramount as it can lead to serious health problems. However most weight loss programs for adolescents are adapted from adult or pediatric programs and lack a peer group component. Unfortunately many adolescent weight loss program participants re-gain weight**.** Self-esteem and sociability have been related to increased levels of physical activity in adolescents and could aid in weight loss maintenance. Teens are highly influenced by their peers. Therefore, a peer group component in a behavioral weight loss intervention for overweight and obese teens could improve long-term outcomes.

Methods: An exhaustive literature search employing OVID-Medline, EBSCO-Psychological and Behavioral Collections, CINAHL, EBSCO-Biological and Web of Science search engines was conducted using search terms: obesity, peers, peer group, adolescent, therapy, treatment, therapeutics, weight loss, teen and pediatric obesity. Randomized controlled trial (RCT) studies published between 1976 and 2014 and in English with the focus on adolescents 11-18years, male and female, and BMI greater than 85% for age were included. Studies investigating obesity and any illness (eg, diabetes) were excluded.

Results: A total of 158 articles were identified with 15 full-text articles accessed for relevancy and two RCT publications were found. These studies demonstrated that a peer group component improves long-term weight loss outcomes overtime. However, the overall quality of the studies was low to moderate and thus further investigation is warranted in this area to evaluate the impact engaged peer groups would have on long-term weight loss maintenance.

Conclusion: There is some usefulness of an active peer group intervention in the treatment of overweight and obese teens; older adolescents benefit more and long-term connection for the adolescents appears to be an important factor. More focused research and dedication pertaining to peer group enhanced weight loss intervention and its maintenance is necessary.

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A Clinical Graduate Project Submitted to the Faculty of the

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Biography

Suzanne Nerli is a native Michigander and received her Bachelors of Science from Michigan State University. Always dedicated to helping others, she had rewarding careers in social work and therapeutic massage. Active in her community she was a small business owner and volunteered at Hospice, HeadStart, not-for-profit housing organization, food and recycling drives and through other various community outreach. As a Rural Health-Care Tract Scholarship recipient and Oregon Primary Health Care Program recipient, she plans to pursue a career in family practice within a rural Oregon community.

Abstract

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List of Abbreviations

BMI……Body Mass Index
BWC……Behavioral weight control
CBT……Cognitive Behavioral Treatment
EXER……..…Aerobic exercise
PEAT.....Peer-enhanced adventure therapy
PBST…….……Peer Based Skill Training
RCT……Randomized Control Study
SES……..……Socioeconomic status

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BACKGROUND

Adolescent obesity has a significant impact on physical and psychosocial health.[1] In comparison to normal-weight peers, teens who are overweight or obese have a higher risk of physical and psychosocial comorbidities.[2] With weight status is an independent risk factor for adult obesity,[3,4] these teens enter into adulthood with increased risks of hyperlipidemia, hypertension, metabolic syndrome and premature joint dysfunction.[2,5]

Although prevention of obesity is important in the global approach to addressing this epidemic, effective treatment for obese adolescents that result in long term weight loss maintenance could be one of the pivotal components to substantially turning back society's problems of growing waistlines and reducing co-morbidities often related to obesity. Kirk et al[6] has shown that with a moderate decrease in BMI within a population of obese children and adolescents, there were corresponding significant decreases in blood pressure and serum cholesterol as well as improved insulin and lipid levels.

Historically, weight loss approaches targeting teens between 13 and 17 years old have been modified weight reduction programs originally designed for either children and included a strong parental involvement or, an intervention aimed at adults and did not consider the unique characteristics of adolescence.[5] Jelalian and Mehlenbeck[2] report that the majority of weight loss interventions used with teens did result in modest weight reduction. But, in their research they

found a trend in weight gain during follow-up. It is the maintenance of the weight reduction that is key to decreasing their risk factors and improving their self-perception and associated psychosocial elements. Wing and Jeffery[7] report that some studies with adults have demonstrated that social support is frequently associated with long term adherence to lifestyle changes indicative to weigh loss maintenance. Since a teen's peer group has been correlated with their eating and exercise behaviors,[8] it is fair to speculate that, given an adolescent's peer group is a central focus for them, integrating the appropriate interactive peer culture into a behavioral weight loss intervention would provide the support uniquely necessary to this population.

Adolescence is a distinctive time for individuals. They experience a myriad of challenges, changes and begin developing a more keen and abstract sense of themselves and their environment.[9] Their self-esteem becomes more global and encompasses academic ability, athletic ability, appearance, social relations and moral conduct. It is during this developmental phase that individuals begin to become more autonomous, moving away from parental influence and toward a more egalitarian relationship with their parents. This relational shift coincides with an adolescent's increased drive to identify with and assimilate into certain peer groups. These peer friendships are fostered through mutual interests, behaviors and outlooks.[9] Additionally it can have a protective effect from the many stressors encountered during their shift from childhood to adulthood and therefore provide a safe space in which teens are able to continue making positive changes.[8]

Maintenance of the weight loss is paramount to improving the teen's mental and physical health. Cultivating this support system through the weight loss intervention and then preserving the connection afterwards would assist the overweight and obese teens in continuation of their successful weight loss and life style changes. Examining whether an engaged peer group

component in a behavioral weight loss program for overweight and obese teens resulting in long-term success is the focus of this systematic review.

METHODS

An exhaustive literature search using OVID-Medline, EBSCO-Psychological and Behavioral Collections, CINAHL, EBSCO-Biological and Web of Science search engines was completed in July 2014. Search terms employed were: obesity, peers, peer group, adolescent, therapy, treatment, therapeutics, weight loss, teen and pediatric obesity. Bibliographies of studies and other relevant articles were searched for further sources. Studies included in the search were randomized controlled trials, published in the English language and between the years 1976 and 2014. The population focus of the studies were adolescents age 11-18years, male and female and BMI greater than 85% for age. Although studies were not limited to the United States, any studies looking at obesity with additional illnesses (eg, diabetes) were excluded. Articles were assessed for quality using the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE).[10]

RESULTS

A total of 158 articles were identified and of those, 129 were screened with 15 full-text articles accessed for relevancy. Two publications[11,12] fit the inclusion criteria and thus comprise this systematic review. These two studies[11,12] were randomized controlled trials and demonstrate the benefit of an engaged peer group component in the long-term weight loss maintenance (see table I). Two additional publications [2,5] was found but were excluded because one was a small single intervention study[2] and the other only a study protocol.[5]

This randomized control trial[11] investigated the effectiveness of cognitive behavioral treatment with peer-enhanced adventure therapy (PEAT), cognitive behavioral treatment with aerobic exercise (EXER) and standard care. Participants were recruited from advertisements in local newspapers. Eligibility criteria included being between 20 and 80% overweight as defined by BMI, being between the ages 13 – 16 years, having one parent able to participate with the teen and speaking English. Participants were excluded if they met the criteria for a major psychiatric disorder at the time of evaluation, were taking medications that might impact weight loss, had medical co-morbidities that would influence participation or were already involved in counselling or a weight loss intervention.[11]

The study initially included 89 adolescents that were prognostically balanced regarding percent-overweight, BMI or other baseline variables and through an urn randomization process allocated into PEAT (n=37), EXER (n=39) or standard care (n=13). The standard care arm was eliminated because participants and their parents had concerns with treatment intervention and associated attendance. These participants were not reallocated into the remaining two study groups. The participants were comprised of 79% Caucasin, 71% female, 29% male, with an average age of 14.51 years and from middle-income socioeconomic (SES) households. The authors report by the 10 month mark there was a 26% drop out rate.[11]

All remaining participants and their parents attended separate weekly sessions focusing on nutrition, portion control, goal setting, value of exercise, importance of parent-child contracts, impact of social influence on lifestyle, stress and eating. Parent meetings topics were similar to their teen's but included tools to help support and motivate their child’s weight loss and exercise

and in turn, help the family. All teens were involved in 30 minutes exercise at the weekly meeting as well as daily physical activity.[11]

The EXER cohort participated in weekly organized and supervised aerobic activities while the PEAT cohort participated in a variety of unique experiential activities that challenged them both physically and mentally in a safe environment. Following the completion of the 16 week intervention, all participants were involved in monthly maintenance gatherings in their respective groups for 4 months.[11]

The primary outcomes were changes in absolute weights and BMI from baseline to post-intervention and then to the 10 month from randomization mark. At the completion of the 16 week intervention, the PEAT group lost an average of 5.31kg (sd=5.61) and the EXER group 3.20 kg (sd=3.61). However, at the 10 month mark the PEAT group had lost an average of 3.40kg from baseline (sd=8.16) and the EXER demonstrated 0.67kg (sd=5.50) from baseline.[11]

Weight loss benchmarks were also utilized to compare the treatment groups at the 16 week and 10 month evaluations. The first benchmark was whether or not participants were able to achieve a minimum of 4.5kg (10lbs). There was no statistically significant difference between the two treatment groups at the 16 week point. However, at 10 months 35% of the PEAT group had maintained a weight loss of at least 4.5kg where the EXER group only 12% had been able to maintain this loss (x^2 =4.07, P<0.05). This data resulted in relative risk of 2.92 and a number-needed-to-treat of five.[11]

The authors also examined the groups in relation to a 5% and 10% weight loss maintenance benchmark at the completion of the intervention and at 10months. Again, there was

no statistically significant difference between the two treatment groups at the 16 week point. However, at 10 months post randomization 23% of the PEAT were able to successfully maintain a 10% weight loss where only 4% of the EXER group was able to sustain (x^2=3.90, P<0.05). This data resulted in a relative risk of 5.75 with a number-needed-to-treat of six.[11]

Interestingly, the researchers noted that with the older half of the study groups (over 14.75 years), participants in the PEAT group had lost and maintained an average of 5.87kg at the 10 month evaluation. On the other hand, their peers in the EXER group had gained an average 0.46kg from baseline.[11]

With regards to changes in psychosocial measures, there was no difference between the PEAT and EXER groups. Unicatiate test showed that both groups of teens had a significant increase of their global self-concept (F=4.96, df=2, 100 P<0.01), physical appearance (F=30.33, df=2, 100 P<0.01) and physical self-worth (F=16.67, df=2, 100 P<0.01). No other significant improvements were demonstrated in either group with the other psychosocial categories.[11]

Limitations to the study include a possible lack of measurement sensitivity in regards to the participant's psychosocial changes. The authors report that the assessment tools used might not have been sensitive enough to detect changes over time or detect potential differences between the PEAT and EXER groups. Also, in an attempt to measure the effectiveness of the PEAT intervention, Jelalian et al[11] measured social support instead of social relationships and admit that the intervention's influence on the teens could have been brought about in ways other than through the traditionally measured social support and self-worth values. Thus the authors' expected effect size of the PEAT intervention could have overestimated the differences between the groups (PEAT versus EXER).[11]

Other limitations include an absence of participant daily caloric and meal composition documentation and therefore Jelalian et al[11] were unable to investigate the relationship between dietary compliance and weight loss. Body composition was not measured on any of the participants during the study. Lastly, since the standard of care arm was discontinued, the study was unable to reflect on the EXER and PEAT interventions results versus nutrition counseling alone.[11]

Lloyd-Richardson et al

This study was a randomized control trial[12] comparing the long-term results of behavioral weight control with peer-enhanced adventure therapy (PEAT) and behavioral weight control with aerobic exercise (EXER) in an obese adolescent population. Participants were recruited from pediatrician offices and through advertisements in local newspapers. Eligibility criteria included being between 30-90% over-BMI, being between the ages 13-16 years, having one parent able to participate with the teen and speaking English. Participants were excluded if they were taking psychiatric medications or medications that might impact weight loss, had medical co-morbidities that would impact participation or were already involved in counseling.[12]

Using an urn randomization procedure with percent over-BMI and gender as covariates, 118 participants were assigned to either PEAT group (n=62) or EXER group (n=56). Participants were then divided into small groups of 6-8 teens per cohort group which met 2 times per week for the 16 week intervention. One meeting was designed for the behavioral weight control (BWC) component and the second meeting was for the PEAT or EXER portion. The BWC encompassed nutrition education and counseling including 1400-1600 calorie dietary guidelines, detailed food journals, portion control, dietary exchange and relapse strategies. Parents attended

weekly meetings similar to their child's BWC meeting but the parent's focus was on ways to support their child's lifestyle changes and family involvement.[12]

Lloyd-Richardson et al[12] utilized the urn randomization procedure to ensure that the groups were prognostically balanced. The study at initiation was comprised of 68% female, 38% male with a mean BMI of 31.41 (sd=3.33) and a mean age of 14.33 years (sd=1.02). The population that completed the 24 month follow up (n=89) was made up of 76% Caucasian, 13% African-American, 7% Hispanic, 70% female and 30% male. They had an average age of 14.29 years (sd=0.98) and average BMI 31.23 (sd=3.45).[12]

During the other weekly meeting, teens randomized to the PEAT intervention participated in peer-based physical activity founded on the philosophies of Outward Bound that included an emphasis on building the adolescent's skills around teamwork, self-efficacy and social interaction. The EXER group comprised of organized professionally led physical exercise. Daily physical activity was prescribed for all participants.[12]

Once the 16 week intervention was completed, the researchers invited the program participants to return for 4 biweekly maintenance group sessions and quarterly activities to maintain contact with their cohorts and researchers.[12]

The primary outcomes of the study were percent-over-BMI and z-BMI. Secondary endpoints included psychosocial factors such as self-perception, self-concept and self-efficacy (the ability to believe they will succeed). Researchers also collected intervention-specific data in order to explore the connection between these influences and long-term weight outcomes.

Measurements were done at the end of the 4 month intervention, and then at 12 and 24 months post randomization.[12]

Both the members of the PEAT and EXER had a decrease in their percent-over-BMI at the 4 month and 12 month measurements but demonstrated a gain between the 12 and 24 month post randomization marks. But when adjusted for growth, the z-BMI for the EXER cohort when comparing 12months and 24 months, showed a gain from 1.85 (sd=0.43) to 1.88 (sd=0.45). Conversely, the PEAT demonstrated a continual decrease from 1.78 (sd=0.49) to 1.77 (sd=0.52) in their zBMI score 12 months to 24 months post randomization. See table II.[12]

Psychosocial factors such as the self-concept and perception domains showed increases equal to the improvements in weight and the improvements measured in physical appearance-related self-concept were retained at the 24 month mark. No other changes in self-efficacy were recorded.[12]

The authors identified limitations in the study which included a 25% participation drop out at the 24 month post randomization mark and given the sample size it did not allow for data interpretation based on gender, race or ethnicity. Lastly, they compared two 'relatively intensive BWC interventions' without a standard of care arm thus limiting the data interpretation to PEAT outcomes versus EXER outcomes.[12]

DISCUSSION

Obesity has many long-term ramifications, especially when the obese individual is a child or adolescent. Although prevention of obesity is a cornerstone to its eradication, treating the overweight and obese pediatric population of teens is also a pressing issue. Finding the best

method to treat obese and overweight teenagers is a key to successful long term weight loss and thus the reduction of possible associated comorbidities. Teens rely heavily on their peer group to help mold their choices. Utilizing this influence in a helpful and supportive fashion as part of a weight loss intervention designed for overweight and obese teens could have positive short and long term effects.

This systematic review examined two studies[11,12] that questioned whether an engaged peer component to a behavioral weight loss intervention for overweight and obese teens improve long term weight reduction outcomes. Both studies demonstrated positive results in weight loss and some improvements in the participant's psychosocial dimensions. Lloyd-Richardson et al[12] was the only study to measure both anthropometric and psychosocial data through 2 years post randomization. Their findings concluded that peer group involvement in a behavioral weight loss intervention proved to be successful at assisting in the maintenance of the lost weight and improved the participant's physical appearance self-concept. Jelalian et al[11] not only found a positive correlation between PEAT and long-term weight loss but measured significantly better outcomes with adolescents aged 14.75 years and older.

The major limitations for these studies include recruitment bias, lack of allocation concealment, and absence of psychosocial data. Although it was admirable of Jelalian et al[11] to consider their standard of care group participants and their parent's feedback, this arm of the study was not harming its members and could have provided data to better support the author's claim that PEAT is a beneficial method for weight loss intervention in adolescents, especially older ones. See table I.

Since both studies[11,12] had a Caucasian female enrollment dominance, and recruitment bias was also a major limitation. Although both studies[11,12] were looking at the effects of a peer component within weight loss programs not specific to gender or race, their demographics as well as SES profile call into question the validity of their results for males, individuals of minority populations as well as any adolescents from a lower to middle socioeconomic status (SES) household.

These studies lacked allocation concealment in that there was no blinding and that the groups were from the same study location. This lead to the possibility of cross-contamination between intervention group members which could affect an individual's efforts and thus impact measured outcomes. Furthermore, the absence of baseline psychosocial data for both studies makes it difficult for a complete comparison between the groups in regards to self-perception.

Neither study mentioned the dynamics within each group. Within any setting where individuals must learn to work together team dynamics can play a large role in the individual's motivation to participate. If group dynamics were such that certain participants did not feel emotionally safe, and there was no opportunity for them to voice their concerns confidentially, anthropometric and psychosocial data might not represent the true effect these unique peer group interventions report.

Conversely, the weight reductions noted in each study could be the result of regular group meetings of like-peers with the same focus combined with structured physical activity that in turn empowered the adolescents to make the changes necessary to lose weight. Strategies to assist these adolescents in the continuation of incorporating these lifestyle changes could be an

avenue to pursue in regards to the multidimensional nature peer group dynamics within the adolescent population.

Lloyd-Richardson et al[12] questioned the possible inaccuracy of the 'self-efficacy related to weight control behaviors' measurement used in their study; that theses authors speculate that these measurements may not 'translate' well to the teen population and that adolescents might over estimate their initial efficacy in physical activity and weight control measures. These points raised are worthy of further investigation and consideration of a redesign of said questionnaires and evaluation tools.

Further study is warranted in this area in order to evaluate the true impact engaged peer groups would have on long term weight loss maintenance in overweight and obese adolescents. Because the overall low to moderate quality of evidence of these studies, some of their results are questionable. A study protocol[5] was published in early 2014 that aims at investigating pediatric obesity from a multidisciplinary approach. This well focused study, once completed might clarify a strong approach in adolescent weight loss intervention and its maintenance.

CONCLUSION

The impact of an active peer group component in a weight loss intervention for overweight and obese adolescents could be highly effective. Due to the low to moderate quality of the current pioneer studies on this topic, it is difficult to ascertain as to what type of intervention is best. However, what these studies have demonstrated is that there is some utility an active peer group intervention, older adolescents benefit more, and that long-term involvement seems to also be an important factor. Although family support is key, there still remains the question of the impact of a peer group that needs more attention.

The area of adolescent obesity treatment is relatively new. Weight loss interventions for teens traditionally are modified adult or pediatric programs and there is a severe lack of sensitivity to the needs of this specific demographic. Much more focus and dedication pertaining to peer group enhanced weight loss intervention and its maintenance is needed. Although the prevention of obesity in all age groups is necessary, the treatment of current obesity, specifically adolescents, is imperative if society is to address rising health care costs and associated co-morbidities.

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Table I. Characteristics of Reviewed Studies

Quality Assessment									
		Downgrade Criteria					Upgrade Criteria	Quality	Importance
No. of Studies	*Design*	*Limitations*	*Indirectness*	*Imprecision*	*Inconsistency*	*Publication bias likely*			
Weight									
2	2 RCT	Serious[a]	Not serious	Serious[b]	Not serious	Not likely	Large RR[c]	Moderate	Critical
Long-term maintenance of weight reduction									
2	2 RCT	Serious[a]	Not serious	Serious[b]	Not serious	Not likely	Large RR[c]	Moderate	Important
Self-Perception									
2	2 RCT	Very serious[a,d]	Not serious	Serious[b]	Not serious	Not likely	NA	Very low	Critical

[a] Lack of allocation concealment and high risk of recruitment bias in both studies.
[b] Small sample sizes, wide standard deviations and data is absent for baseline psychosocial measurements in both studies.
[c] In the Jelalian et al study, for 4.5kg weight loss at 10 months benchmark RR = 2.92 and for the 10% weight loss at 10 months benchmark RR = 5.75
[d] Self-perception was measured using subjective questionnaires.

Table II. Group differences for measures of percent-over-BMI and z-BMI Lloyd-Richardson et al[12]

	Baseline, Mean (SD) PEAT vs EXER		*4 month Mean (SD) PEAT vs EXER*		*12 month mean (SD) PEAT vs EXER*		*24 month mean (SD) PEAT vs EXER*	
Percent-over-BMI	*161.00 (17.99)*	*161.74 (15.44)*	*151.93 (18.85)*	*153.41 (17.05)*	*151.37 (19.69)*	*153.43 (18.70)*	*151.44 (20.75)*	*154.56 (19.54)*
z-BMI	2.02 (0.34)	2.05 (0.27)	1.80 (0.44)	1.86 (0.35)	1.78 (0.49)	1.85 (0.43)	1.77 (0.52)	1.88 (0.45)